

Single-axis functions

The single-axis firmware module lets the controller move the actuators in patterns including sawtooth, triangle, and square waves. This module is intended to run off a 4Khz internal clock, though provision has been made to accept an external clock on the TTL input (only lightly tested). They can also be configured to output TTL pulses upon completion of each cycle. For both these TTL functions, the corresponding physical connectors need to be in place.

Provision has been made for the user to control the following features of the single-axis output pattern:

- Waveform period (SAF)
- Peak-to-peak amplitude (SAA)
- Offset or initial center point (SAO)
- Pattern and miscellaneous configuration settings (SAP)

Note that some of these settings are also used by the SPIM firmware module. When a SPIM scan is initiated then any active single-axis function on the MicroMirror card is stopped. When SPIM is armed for a piezo card any active single-axis function on the card is stopped.

The SAM command is used to activate and also inactivate single-axis patterns.

While a single-axis mode is active (i.e. when the pattern is being generated and output), the axis move status character (accessed by RDSTAT [axis]+) is set to A.

When single-axis mode is active then moving the axis (either using MOVE or MOVEREL or by using the joystick or wheels) will automatically update the offset. Thus, the single-axis pattern always has the same position on start-up as where it last was used, unless the SAO command has been used in the interim to select a new offset. However, moving the axis position while the single-axis mode is idle does not change the offset.

For MicroMirror cards with fast DACs (usually axes A and C, or axes P and Q), the single-axis functions update the fast DACs at a rate of 40kHz beginning with firmware version 2.8. Otherwise, the DAC update rate is 4kHz divided by the number of card axes. e.g. 1kHz for typical 4-channel SPIM Micro-Mirror cards and 4kHz for ADEPT piezo cards (but the mechanical response of piezos is much slower than 4kHz). The phototargeting builds have only two fast DACs, usually axes H and I, and include provision for drawing circles/ellipses to perform ring TIRF.

While the single-axis mode is active, changes to the parameters (e.g. executing SAA, SAF, SAP, or SAO) automatically take effect as of firmware version 2.82. However, axis synchronization may be lost during the update, so if synchronization is important then it should be performed again after any parameter changes are made by executing SAM with mode 3 again.

In [Command:TTL OUT mode 22](#), TTL OUT0 is controlled by the [single-axis function](#) firmware module. With the [Command:SAP](#) user can generate a TTL pulse that are synchronised with [single-axis function](#) actuator motion. Available only in Tiger firmware v3.17 and above.

- [Command:SAA](#) 2016/03/17 19:57
- [Command:SAD](#) 2026/04/29 19:06
- [Command:SAF](#) 2016/03/17 20:03
- [Command:SAM](#) 2016/03/17 20:05

- [Command:SAO](#) 2016/03/17 20:18
 - [Command:SAP](#) 2016/03/17 20:14
 - [Command:SAR](#) 2026/04/29 19:06
- [ms2000, tiger, advanced feature](#)

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